

# Active Flow Control with Adaptive Design Techniques for Improved Aircraft Safety, Phase II

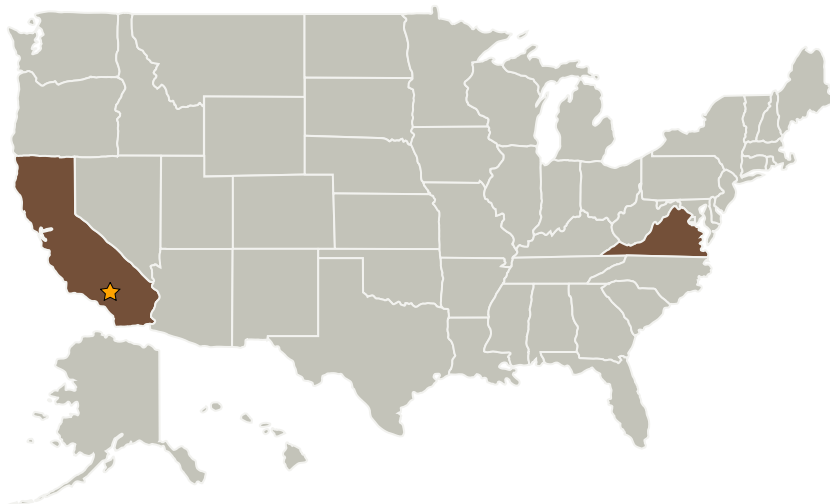
Completed Technology Project (2008 - 2009)



## Project Introduction

The overall objective of this STTR effort is to evaluate and demonstrate the potential for well-designed, strategically-located synthetic jet actuators to provide improved aircraft safety by: (1) delaying wing stall and improving aircraft controllability at high angles of attack and (2) providing low-cost actuation redundancy to improve controllability in the event of a mechanical control surface failure. Delaying flow separation (i.e., wing stall) and providing "back-up" control power could allow an aircraft to recover from adverse conditions (due to a control surface failure, pilot/autopilot error, etc.) that would otherwise result in a loss of control. Flow control studies have shown that synthetic jet actuators are efficient devices for controlling separated internal and external flows. However, an obstacle to the widespread application of synthetic jet actuators for practical flight control is that modulated input signals to achieve closed-loop flow control objectives have been shown to be complex. Barron Associates, the University of Virginia, and the University of Wyoming propose to develop a software toolbox for the creation of adaptive control systems for actuators having complex, nonlinear dynamics. The Phase II effort will culminate in a wind tunnel test that quantifies the safety improvement potential offered by adaptively-controlled synthetic jet actuators.

## Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work             | Role                    | Type        | Location                  |
|---|-------------------------|-------------|---------------------------|
| ★ Armstrong Flight Research Center (AFRC) | Lead Organization       | NASA Center | Edwards, California       |
| Barron Associates, Inc.                   | Supporting Organization | Industry    | Charlottesville, Virginia |

| Primary U.S. Work Locations |          |
|-----------------------------|----------|
| California                  | Virginia |

## Project Transitions

 **January 2008:** Project Start

 **December 2009:** Closed out

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Armstrong Flight Research Center (AFRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.3 Aeroelasticity